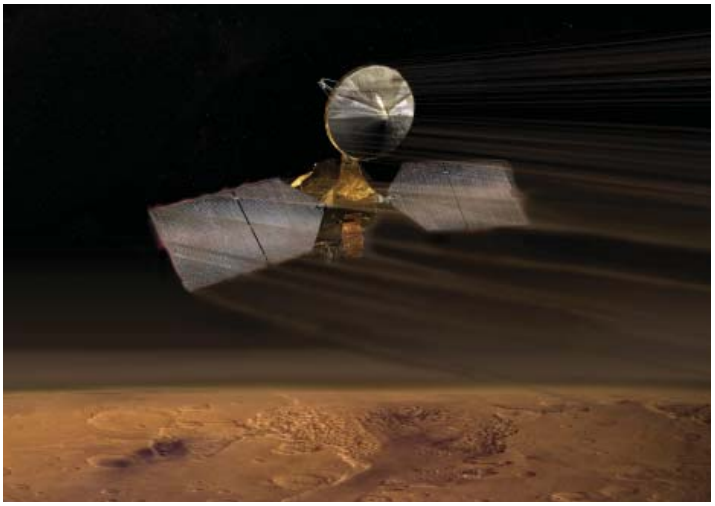
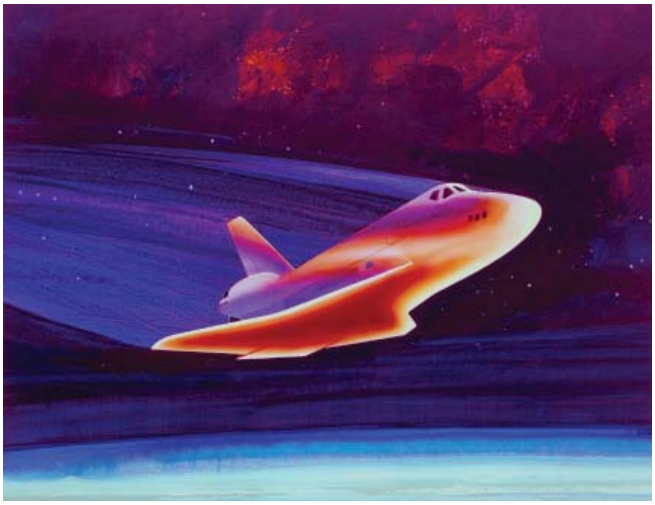
technology opportunity

High Efficiency Tantalum-based Ceramic Composite Structures

High Impact Resistance Ceramic Material for Thermal Protection





The composite structure is substantially impervious to hot gas penetration and capable of surviving high heat fluxes at 3000° F and above.

Tantalum-based ceramics are suitable for use in thermal protection systems. These composite structures have high efficiency surfaces (low catalytic efficiency and high emittance), thereby reducing heat flux to a spacecraft during planetary re-entry. These ceramics contain tantalum disilicide, molybdenum disilicide and borosilicate glass. The components are milled, along with a processing aid, then applied to a surface of a porous substrate, such as a fibrous silica or carbon substrate. Following application, the coating is then sintered on the substrate. The composite structure is substantially impervious to hot gas penetration and capable of surviving high heat fluxes at temperatures approaching 3000° F and above.

Benefits

- High impact resistance to temperatures above 3000° F
- Impervious to hot gas penetration
- Provides a composite insulating structure

Applications

- Engine protection for automotive industry
- Pressurized gas line protection
- Thermal barriers
- Composite materials

Technology in Detail

The tantalum-based ceramics contain tantalum disilicide, borosilicate glass and, optionally, molybdenum disilicide. The components are milled, along with a processing aid to facilitate sintering, and then applied to a surface of a porous substrate, such as a fibrous or open pore foamed silica, carbon, aluminosilicate, silicon carbide or silicon oxycarbide substrate, as well as other substrates of silicon/carbon compositions. Following application, the coating is then sintered on the substrate. The composite structure is substantially impervious to hot gas penetration and capable of surviving high heat fluxes (temperatures approaching 3000° F(1650° C) and above).

Patents

This technology has been patented (U.S. Patent 7,767,305).

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to inquire about licensing possibilities for this technology for commercial applications.

For More Information

If you would like more information about this technology, please contact:

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